

REMARKS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 39-78 are pending in this application. Claims 39, 62, and 76 are amended, and Claims 77 and 78 are added by the present amendment.

Amendments to the claims and new claims find support in the application as originally filed, at least in the claims and the drawings at Figures 1a, 1b, and 1c, and in the specification at page 12, lines 15-22. Thus, no new matter is added.

In the outstanding Office Action, Claims 62 and 76 were rejected under 35 U.S.C. § 112, second paragraph; Claims 39-43, 47-49, 54-56, 59-61, 65, 67, 69, and 70 were rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent 6,735,357 to Jensen, in view of U.S. Patent 6,776,492 to Chang and U.S. Publication 2003/0133204 to Chen et al. (herein “Chen”); and Claims 44-46, 50-53, 57, 58, 63, 64, 66, 68, and 71-75 were indicated as allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Applicants gratefully acknowledge the indication of allowable subject matter in Claims 44-46, 50-53, 57, 58, 63, 64, 66, 68, and 71-75.

In addition, Applicants respectfully traverse the rejection of Claims 39-43, 47-49, 54-56, 59-61, 65, 67, 69, and 70 under 35 U.S.C. § 103(a) as unpatentable over Jensen, Chang, and Chen, in view of amended Claim 39 and comments below.

Claim 39 is directed to an optical deflection matrix that includes at least two optical deflection modules. Each of the two optical deflection modules includes, in part, an own single deflection element. The own single deflection element of each of the two optical deflection modules is configured to assume plural potential positions that are in relation to potential directions of incoming or outgoing light.

In a non-limiting embodiment, Applicants' Figure 2 shows an example of an optical deflection matrix that includes two optical deflection modules M1 and M2 (e.g., "at least two optical deflection modules"). In the example of Figure 2, each of the two optical deflection modules M1 and M2 includes a single deflection element 1 (e.g., "each optical deflection module comprises an own single deflection element"). As further illustrated in the non-limiting embodiment of Applicants' Figure 1c, the deflection element 1 of each of the two optical deflection modules is mobile about an axis directed out of the page, in this example. Also, the optical deflection module may assume predetermined positions causing an incoming light beam f1 to be deflected to directions d2, d3, or d4, in this example (e.g. plural potential positions that are in relation to potential directions of the first set). In other words, in the non-limiting example of an optical deflection matrix shown in Applicants' Figure 2, each of the at least two optical deflection modules M1 and M2 includes an own single deflection element 1.

Applicants respectfully submit that Jensen, Chang, and Chen, fail to teach or suggest each of the features of amended independent Claim 39. Further, Applicants respectfully submit that Claim 39 would not have been obvious at the time the invention was made to a person of ordinary skill in the art based on the disclosures of Jensen, Chang, and Chen.

Jensen describes an active control system and method for controlling the position of optical components in an optical switch of an optical communications network.¹ According to Jensen, an optical cross-connect switch 10 (e.g., an optical deflection matrix) includes a plurality of input mirrors 14a, 14b, 14c, and 14d that each receive an optical signal and reflect the optical signal to a shared flat mirror 18.² Further, Jensen indicates that the shared flat mirror 18 reflects the optical signals to one of plural output mirrors 15a, 15b, 15c, and 15d.

¹ Jensen at Abstract.

² Jensen at Figure 1 and at column 4, lines 11-24.

In addition, Jensen indicates that “each output mirror must be accurately positioned to receive a data signal from a corresponding input mirror and direct the data signal through an output port.”³ In addition, Jensen indicates that “the optical cross-connect switch can comprise up to hundreds of thousands of mirrors for switching incoming optical signals to a corresponding number of output fibers.”⁴ In other words, Jensen indicates that a plurality of input and output mirrors (e.g., optical deflection modules) may be used to deflect light to a common shared and fixed flat mirror 18 (e.g., deflection element), and to increase the number of optical signals switched by the optical deflection matrix, additional pairs of input and output mirrors (e.g., optical deflection modules) may be added up to hundreds of thousands. Thus, the optical deflection modules of Jensen all share a common flat mirror 18 (e.g. deflection element). Accordingly, Jensen fails to teach or suggest an optical deflection matrix that includes at least two optical deflection modules in which each of the two optical deflection modules includes its own deflection element. Accordingly, it is respectfully submitted that Jensen fails to teach or suggest “an optical deflection matrix comprising: at least two optical deflection modules . . . wherein each optical deflection modules comprises an own single deflection element . . . and two fixed return elements positioned on either side of the deflection element,” as recited in Claim 39.

Chang describes using multiple reflective mirrors in a module with three mirrors in a series.⁵ According to Chang, a multiple reflective mirror module has a fixed reflective mirror and first and second tilting reflective mirrors.⁶ Further, Chang indicates the fixed reflective mirror can be replaced by a third tilting reflective mirror.⁷ Further, Chang indicates “the multiple reflective mirrors module according to the present invention can enlarge the working

³ Jensen at column 5, lines 12-14.

⁴ Jensen at column 3, line 67 to column 4, line 3.

⁵ Chang at Abstract and Figure 2.

⁶ Chang at column 2, lines 29-32.

⁷ Chang at column 2, lines 56-57.

angle of the optical engine and increase the lifetime thereof.”⁸ Moreover, Chang indicates that an object of the invention is to provide multiple reflective mirrors that efficiently increase the total working angle thereof.⁹ In addition, Chang indicates that the multiple reflective mirrors with plural moving mirrors as shown in the embodiments of Figures 1 and 2 “can provide an extended scanning angle and a high scanning speed.”¹⁰

In other words, according to Chang, a multiple reflective mirrors module advantageously uses several mobile mirrors and does not use only a single mobile mirror because the goal of Chang is to provide a large working angle and a high scanning speed. Further, each of the embodiments of the multiple reflective mirrors module described by Chang includes multiple reflective mirrors that are mobile. Therefore, Chang does not teach or suggest an optical deflection module that has a single deflection element configured to assume plural positions and two non-moving elements. Accordingly, it is respectfully submitted that Chang fails to teach or suggest the features lacking in the disclosure of Jensen, and in particular, Chang fails to teach or suggest an optical deflection module that includes “an own single deflection element . . . configured to assume plural potential positions . . . and two fixed return elements positioned on either side of the deflection element,” as recited in independent Claim 39.

Chen describes a derotation mirror system for a periscope that includes three mirrors 204, 206, and 208 that are fixed with respect to one another.¹¹ Thus, Chen does not teach or suggest any deflection element configured to assume plural potential positions. Accordingly, it is respectfully submitted that Chen also fails to teach or suggest the features lacking in the disclosures of Jensen and Chang noted above.

⁸ Chang at column 2, lines 65-67.

⁹ Chang at column 2, lines 20-23, 29-34, and 56-67.

¹⁰ Chang at column 4, lines 10-12.

¹¹ Chen at Figure 4.

Accordingly, Applicants respectfully submit that independent Claim 39, and claims depending therefrom, patentably define over Jensen, Chang, and Chen, whether taken individually or in combination.

In addition, Applicants respectfully traverse the assertion in the Office Action that it would have been obvious to one of skill in the art at the time of invention to use the teachings of Chen and Chang to modify the optical system of Jensen with the deflection element 224 of Chang and the two fixed return elements 204 and 208 of Chen.¹² As noted above, Chen describes a derotation system in which the angles of three mirrors are fixed with respect to one another, and Chang describes a deflection module in which two or more mirrors are configured to rotate to provide as large a working angle and a high scanning speed as possible. Thus, the structures and goals of the disclosures of Chang and Chen appear to be opposite to one another. Further, as the teachings of Chang and Chen appear to be opposite to one another, it cannot be said that one of skill in the art would have been motivated to combine them with the teachings of Jensen. For example, Chang recommends using plural mobile mirrors and Chen recommends using no mobile mirrors. Thus one of skill in the art would not be motivated to make the central mirror of Chang mobile and to fix the two end mirrors of Chang in order to keep only one mobile mirror, because Chang tries to use as many mobile mirrors as possible to “enlarge the working angle of the optical engine and increase the lifetime thereof.”¹³

Therefore, in addition to the separate reason noted above, it is respectfully submitted that independent Claim 39 also patentably defines over Jensen, Chang, and Chen, because one of skill in the art would not have been motivated to combine those references to achieve the claimed features.

¹² Office Action at page 6, last paragraph.

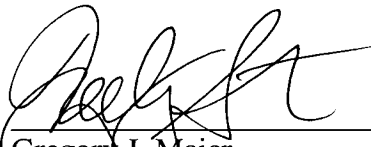
¹³ Chang at column 2, lines 66-67.

Accordingly, it is respectfully submitted that independent Claim 39 and claims depending therefrom are allowable.

Consequently, in light of the above discussion and in view of the present amendment, this application is believed to be in condition for allowance and an early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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A handwritten signature in black ink, appearing to read 'Gregory J. Maier', is written over a horizontal line.

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